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September 12, 1996

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Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: *Ex Parte* Presentations in MM Docket No. 87-268, *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*

Dear Mr. Caton:

This will serve as notice that representatives of our client, the Computer Industry Coalition on Advanced Television Service ("CICATS"), met with Chairman Reed Hundt, Commissioner Rachelle Chong, Dr. Robert Pepper, Blair Levin, Julius Ganechowski, Jane Mago, David Siddall, and Rudolfo Baca on September 11, 1996, to discuss CICATS's position on the proposed digital broadcast standard being considered in the referenced proceeding. Jack Krumholtz and Craig Mundie, both of Microsoft Corporation, represented CICATS in those meetings. Messrs. Krumholtz and Mundie discussed matters raised in the Comments and Reply Comments filed by CICATS and in the Comments filed by Microsoft Corporation in the referenced proceeeding. In addition, the parties discussed the possibility of a voluntary compromise between opponents and proponents of the digital broadcast television standard recommended by the Advisory Committee on Advanced Television Service.

The documents appended hereto were distributed at the meetings.

Questions concerning this matter can be directed to the undersigned.

Respectfully submitted,

Kevin S. DiLallo

Kevin S. DiLallo
Counsel for the
COMPUTER INDUSTRY COALITION
ON ADVADVANCED TELEVISION
SERVICE

Enclosures

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List ABCDE

Craig Mundie
Senior Vice President, Consumer Platforms Division
Microsoft Corporation

As senior vice president of the Consumer Platforms Division at Microsoft, Craig Mundie manages the design and development of consumer hardware architectures and related system software technologies and products. His responsibilities include core technologies such as midband and broadband networking, media servers, and multimedia operating system architecture.

The Consumer Platforms Division is responsible for a coordinated effort for handheld, set-top box efforts, and other non-PC system efforts; Microsoft's broadband expertise and systems integration ability to work with large network operators; and advanced consumer electronic technologies.

Prior to joining Microsoft in December 1992, Mundie was a founder and CEO of Alliant Computer Systems Corporation, where he led the development and introduction of the CAMPUS Massively Parallel Supercomputer System. Before assuming the role of CEO at Alliant, Mundie served as vice president of both research and development, as well as marketing.

Before Alliant, Mundie worked at Data General. Hired as a software developer, he wrote the first commercial Disk Operating System for the Data General NOVA. He managed the development of database management software, both proprietary and UNIX operating systems, and compiler software. He also wrote Data General's first data management system, INFOS. Just prior to leaving Data General, Mundie was director of the advanced development facility in Research Triangle Park, North Carolina, where development work on advanced computer systems and related system software was performed.

2/96

WRITTEN STATEMENT OF

CRAIG MUNDIE

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THE ELECTROMAGNETIC SPECTRUM MANAGEMENT POLICY REFORM AND PRIVATIZATION ACT

BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
OF THE UNITED STATES SENATE
WASHINGTON, D.C.

JUNE 20, 1996

TESTIMONY OF CRAIG MUNDIE,
SENIOR VICE PRESIDENT, CONSUMER PLATFORMS DIVISION
MICROSOFT CORPORATION
BEFORE THE
SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
ON THE
ELECTROMAGNETIC SPECTRUM MANAGEMENT POLICY REFORM AND
PRIVATIZATION ACT

JUNE 20, 1996

Good morning, Mr. Chairman and members of the Committee. Thank you for the opportunity to testify today. I am the Senior Vice President, Consumer Platforms Division, of Microsoft Corporation. Microsoft is the world's largest publisher of software for personal computers. The Consumer Platforms Division coordinates Microsoft's efforts in developing products for advanced consumer electronic technologies, hand-held devices, set-top boxes, and other non-PC systems, among other things.

In addition to my responsibilities at Microsoft, last fall I was appointed by FCC Chairman Hundt to represent Microsoft in the final deliberations of the Advisory Committee on Advanced Television Service, or "ACATS." Microsoft had not been a member of ACATS before that appointment.

Microsoft and a number of other software publishers and computer hardware manufacturers have formed a special task force -- the Computer Industry Coalition on Advanced Television Service, or "CICATS" -- to participate in the Advanced Television debate. I am pleased to appear on behalf of CICATS this morning and to present its views on the draft Electromagnetic Spectrum Management Policy Reform and Privatization Act.

As Chairman Pressler's draft legislation recognizes, the electromagnetic spectrum is a valuable and increasingly scarce resource that should be managed in a way that maximizes opportunities for technological advancements. The development of new services that efficiently use spectrum should not be impeded by regulatory restrictions on spectrum use that promote relatively inefficient, less advanced services.

Given the limited supply of usable spectrum, tough decisions inevitably have to be made regarding its best uses. As a general matter, members of CICATS believe that the marketplace, not government, is best equipped to make these decisions. Government policies should be tailored to protecting the public interest in the most desirable uses of spectrum, but the public should be the final arbiter of which uses best serve its interests.

If the process for allocating spectrum is slow or cumbersome, or if spectrum regulation is unduly restrictive, development of new spectrum-based technologies will be discouraged. Whether or not Congress determines that spectrum should be auctioned, government policies should aim to ensure that spectrum is available when emerging advanced services require it. Any regulation of spectrum use that hampers technological progress should be unequivocally justified by clear, compelling benefits to the public which could not be achieved absent that regulation.

For example, restrictions on interference with other uses of spectrum, and regulations designed to ensure adequate spectrum for public safety, transportation, and national security uses clearly benefit the public and are

therefore generally justifiable. In contrast, the public interest would be poorly served by adoption of a standard for spectrum use that would impose significant costs on consumers and discourage future technological development.

Mandating the digital broadcast television standard (DTV) proposed by the Advanced Television Systems Committee (ATSC) will have both of these negative effects. It is costly because the standard is not layered. All receivers must be capable of decoding the highest resolution transmissions regardless of whether they are capable of displaying that resolution. Making the standard a law will lock in today's view of technological capability for a very long time. Any modifications or improvements will have to run the gauntlet of a long and arduous government approval process, something with which even the members of ATSC are already too familiar.

We do not mean to diminish the hard work of the ATSC The standard they have proposed contains some noteworthy attributes, many of which the computer industry supports. And if proponents of that standard believe it will best serve the public's needs and tastes, they should be free to produce and market products meeting the standard.

But those of us who think we can build a better mousetrap -- or digital TV receiver -- should be permitted, in fact, encouraged, to try. We should not be forced to overcome a government-mandated competitive advantage, which adoption of the standard would amount to for its advocates. The public should be allowed to decide what's best for them. Isn't that what drives a free market economy and results in the greatest economic efficiency?

The robustness of this country's computer and software industries is proof that great efficiency, innovation, and productivity can be achieved quickly when industry standards are *voluntarily* set in response to demand. Voluntary standards work. Look at cellular telephones. The FCC recognized that the detailed standards it originally prescribed for cellular telephony were holding back technological development in that industry, and it decided to relax its standards and let the industry establish more advanced standards with minimal government oversight. In doing so, the Commission acknowledged that too much government-specification of industry standards can inhibit technological progress and the availability to consumers of improved services. With Personal Communications Service, or "PCS," the FCC took an even more liberal industry-based approach to standards-setting. It should do the same with digital TV.

Our domestic computer and software industries -- like many other industries -- have thrived in large measure because of two factors: a minimum of government regulation , and open system architecture that permits hardware and software produced by many different firms to interconnect smoothly and encourages rapid, market-driven innovation. Both of these factors would be negated by the FCC's adoption of the Grand Alliance DTV standard, and the public would pay the price.

Let's look for a moment at that standard. Beyond public policy and macroeconomic, free-market considerations, there are both consumer interests and technical drawbacks that make adoption of the standard bad policy.

First, the standard does not provide for a way to manufacture low cost receivers. The encoding technique is monolithic. If a broadcaster chooses to send the highest resolution format a receiver must include all of the circuitry necessary to decode that format. In a layered system, two signals are sent in the channel simultaneously. A low resolution, easily decodable version for smaller cheaper receivers and a higher resolution detail enhancement signal for use by larger, more expensive high definition receivers. In the ATSC system, all receivers, even a little 2" portable must be burdened with means to decode resolution only perceivable on a large screen home theater unit. We have determined that even five years from now a full ATSC decoder will be three times the cost of a base layer decoder. Using the ATSC system will drive up the cost of smaller devices and require consumers to pay for capabilities they may neither need not want.

Second, from a technical perspective, the Grand Alliance standard is a poor compromise, particularly with respect to its video formats. The standard incorporates an obsolete technology, interlaced scanning, that produces an inferior picture and makes inter-conversion for computer uses difficult. In fact, ABC recently announced at a meeting of its affiliates that the network is leaning heavily toward the use of progressive scanning for all its high-definition TV production, because progressive scanning produces a better picture and is less expensive. Even ACATS has admitted that progressive scanning is better. Interlace was an appropriate scheme for the analog television of 40 years ago, but it has no place in a modern digital compressed transmission system.

But broadcasters have been using interlaced scanning for over 40 years. Despite what ABC has said, local stations will have little incentive to replace it with progressive scanning if the FCC adopts a digital standard that allows them to continue to use interlaced. And this is a critical issue for the computer industry because interlaced scanning is unacceptable for text and other computer applications. Any interlaced transmission would have to be converted at the receiver if it is to be used with a computer application. Again, added costs for the consumers.

These limitations of the ATSC proposal would make it more expensive for the domestic computer and software industries to create products -- both hardware and software -- that could enhance the usefulness of digital TVs by marrying digital broadcasting and computers. For these reasons, when ACATS voted to recommend the ATSC standard to the FCC, I abstained.

NTSC broadcast television is transmitted in an analog format. Computer data is digital. As long as analog broadcasting continues, the convergence of TVs and computers will be delayed. But with the advent of digital TV, interactive applications, multimedia, and data sharing between TV and computers are all possible. The products and services that data sharing could make possible are limitless. Microsoft and other firms have committed hundreds of millions of dollars to research and development of products and services that combine computers and TVs; but these products may never reach the stores, at least not at affordable prices, if overly detailed and restrictive regulatory requirements obstruct full compatibility, product development, and competition.

The Grand Alliance says that its proposal provides "adequate" compatibility with computers. We disagree. True, some of the 18 video formats are consistent with computer applications, but the standard also includes a number of inconsistent formats. And if a mandated standard incorporates even one computer-unfriendly format, receiving equipment will need to perform additional conversion and decoding of transmissions to enable interaction with computer applications, the added cost of which will fall on the consumer.

Why does the computer industry care about these issues? Two reasons, mainly. First, we don't want government regulation to freeze technological development without a compelling justification. We think a better DTV standard is possible, and we want the freedom to try it out on the market. Second, our industry knows that computers and TVs can, and will, converge, and we want to be able to develop products that take advantage of that convergence and bring new benefits to the public. Who knows how advanced our National Information Infrastructure can become, if it is allowed to.

In short, in this case, we think voluntary industry standards are better for everyone than government-mandated standards. We understand the value of minimal government-sanctioned technical transmission standards for digital broadcasting, including standards for low level digital bitstream format and modulation technique to prevent interference with other services and would not object to adoption of the ATSC's proposals with respect to those parameters, absent any specified video format.

But specifying a video format is unnecessary and potentially problematic -- exponentially so with 18 formats. We think the marketplace should dictate what video formats it wants. But if the Congress and the FCC find that the public interest would be served by the FCC's adoption of a standard video format for digital television, the standard it adopts should be the best possible. That would not include the hodgepodge of 18 different video formats the FCC is currently considering. If a standard is to be adopted at all, CICATS would propose a simpler, more technologically advanced minimum standard, offering wider compatibility and more flexibility to develop enhancements, if the marketplace warrants.

A year ago, computing capability was not sufficient for the level of convergence of TVs and computers and the sophistication of applications we are developing. It is now. Largely because computer technology is advancing at an exponential rate, the computer industry's interest in advanced television emerged relatively recently. The question should not be *whether* TVs and computers will ever converge seamlessly, but *when* and whether it will be affordable. If the FCC adopts the proposed ATSC standard, the "when" will be years from now -- some say 5 to 7 years later than if the Commission adopts a simpler standard or no standard at all. And when convergence finally arrives, the average consumer will be hard-pressed to afford the advanced products and services convergence will spawn if government regulation imposes a cumbersome, overly complex DTV standard.

If the price of digital receivers and decoders is unnecessarily inflated, the day stations will migrate to all-digital broadcasting will be delayed, and so, in turn, will the day analog spectrum is freed for new uses. In the meantime, precious spectrum could be wasted and consumers could be deprived of better, and cheaper, products and services.

Thank you for your time. I would be pleased to answer any questions you might have.

OVERVIEW

IF GOVERNMENT GETS DIGITAL TV WRONG TODAY, WE'LL ALL BE PAYING FOR IT TOMORROW

In the next few months, the Federal Communications Commission will make a decision affecting how Americans use and watch television far into the next century. Depending on the FCC's decision, this ruling could cost consumers more than $91 billion over the next ten years, freeze technological innovation, and jeopardize -- if not block -- the ability of television to play a role in the Internet and the emerging national information infrastructure.

Background

At issue are new digital transmission standards for "advanced television," including high definition television (HDTV) proposed by the "Grand Alliance," a group dominated by foreign TV set manufacturers, and supported by television broadcasters.

The Grand Alliance proposal has been roundly criticized by consumer groups, film and entertainment leaders, and high technology companies for a number of reasons:

- **Cost to consumers:** The proposed standard would force consumers to spend more than $91 billion over the next ten years just to buy set-top converters capable of receiving HDTV, whether they want it or not. The cost is even higher if consumers replace their old sets with new ones able to decode all of the different broadcast formats under the Grand Alliance standard.[1] Other alternatives are available that would provide consumers with quality digital broadcast TV at a fraction of the cost.

- **Undermine U.S. industry:** The Grand Alliance reflects the fact that TV set manufacturing is dominated by foreign-owned firms. In contrast, America leads the world in film and television programming, computers, and software -- industries that employ millions of U.S. workers. Why not help the hometown team, for a change?

- **Freeze Technology:** The proposed Grand Alliance standard would stifle innovation and competition, and jeopardize the possibility that the highest quality entertainment and

[1] Economics & Technology, Inc., "Economic Considerations in the Evaluation of Alternative Television Proposals" (July 11, 1996).

computer technology can be wrapped into a single system affordable to all. For example, it would:

- slow the convergence of television and personal computer platforms and thereby block the development of an important aspect of the national information infrastructure.

- prevent the public from opting to watch and hear movies on TV as they are experienced in theaters. Filmmakers use the more advanced progressive scanning while the Grand Alliance standard could limit TV to the current, outdated interlaced technology.

- mandate an already-obsolete audio standard instead of more advanced audio coding systems that could be broadcast to American homes.

- **Incompatible with computer technology:** The Grand Alliance's proposed standard presents several problems that makes the standard incompatible with computer technology:

  - use of outdated interlaced scanning technology, which has been used in television for decades but is incompatible with computer applications.

  - spacing of the pixels (or image bits) displayed on the screen. While the Grand Alliance scheme includes non-square pixel spacing, 200 million computers use square pixel spacing. Unless the new digital TV standard incorporates square pixel spacing, consumers will need to purchase and install cumbersome conversion software to tap the full potential of their technology.

  - screen scanning rates which are cumbersome and expensive to convert for computer applications.

Summary

The Grand Alliance proposal will limit consumer choice and cost the public a staggering $91 billion. America's international competitiveness could be undermined if the FCC adopts the proposed Grand Alliance standard that favors foreign TV set makers over U.S.-based computer, software, and entertainment industries. Leaders in the entertainment and computer industries are working to ensure that the future of digital TV is not undermined by the FCC's approval of outdated, inadequate and expensive technical standards.

TECHNICAL BACKGROUND

PROBLEMS WITH THE GRAND ALLIANCE STANDARD

The Federal Communications Commission is considering a digital broadcasting standard for "advanced television," including high definition television (HDTV), proposed by the Grand Alliance, a group dominated by foreign TV set manufacturers, and supported by television broadcasters. These new standards would be:

- cumbersome and restrictive;
- costly to consumers; and
- incompatible with computer formats.

Cumbersome and Restrictive

The Grand Alliance's proposed standard incorporates 18 formats -- a cumbersome, overly detailed, and needlessly restrictive system.

Vertical Lines	Horizontal Pixels	Aspect Ratio	Picture Rate/Scan
1080	1920	16:9 --	60I -- 30P 24P
720	1280	16:9 --	-- 60P 30P 24P
480	704	16:9 4:3	60I 60P 30P 24P
480	640	-- 4:3	60I 60P 30P 24P

A base-line format instead offers greater flexibility and innovation at a more reasonable price for consumers:

Vertical Lines	Horizontal Pixels	Aspect Ratio	Picture Rate/Scan
480	square pixel spacing; number of horizontal pixels would depend upon width of the picture	not specified; variable at broadcasters' discretion	24P, 36P, 72P, using temporal layering (ideally); *or* 24P, 60P, 72P (acceptable, though more costly to consumers)

An alternative base-line format standard, such as that proposed by the computer industry, would include:

- A scanning format with 480 vertical lines, progressive;

- Square pixel spacing regardless of the picture aspect ratio; and

- Ideal picture rates of either 24Hz, 36 Hz or 72Hz using temporal layering. Broadcasters might prefer 24Hz, 60Hz or 72Hz without using temporal layering, but this would increase consumers' costs. Either combination would be acceptable to the computer industry.

Costly to Consumers

Having to accommodate 18 different video formats will increase unnecessarily the cost of television receivers and related consumer equipment.

- Because of the 18 formats, receivers will either 1) require significant processing power to decode all 18 formats; or 2) be less sophisticated and unable to receive programming transmitted in more complex formats.

- Required processing power will make more complex receivers significantly more expensive than sets capable of receiving a base-line format. This will require U.S. consumers to spend billions more than necessary for TV receivers, which are made by foreign-owned companies.

- Higher equipment costs will slow digital TV penetration, hamper educational uses of digital TV, and limit availability of advanced applications, including expanded uses of the National Information Infrastructure.

Incompatible Applications

Several formats required by the Grand Alliance are incompatible with computers because they include interlaced scanning, which is inferior to progressive scanning.

- Progressive scanning produces a superior picture to interlaced and eradicates flicker on text, which interlaced scanning causes.

- Interlaced scanning -- a 50-year-old technology -- has proven unsatisfactory in European and Japanese HDTV systems. Even the Grand Alliance and ABC Television admit progressive scanning is better.

- Including inferior, interlaced formats will increase receiver costs. It is far less costly to consumers to convert a progressive signal to an interlaced display (for legacy sets) than to convert an interlaced signal to a progressive display, such as a computer monitor.

Other shortcomings include:

- The lack of square pixel spacing, which is necessary for computer applications.

- Bit error correction, though less important for broadcasting alone, is required for more sophisticated data transmission.

A NEW ERA IN TELEVISION IS HERE

LET'S GET THE PICTURE RIGHT.

Digital technology is the future of television. The future can offer astonishing possibilities – clearer and crisper pictures with better sound, movies seen and heard as they are experienced in theaters, and PCs able to receive digital TV broadcasts.

But there are clouds on this sunny horizon . . . because the Federal Communications Commission is being asked to adopt regulations favoring the interests of foreign TV set manufacturers – and push the public interest aside. If the FCC adopts these regulations, American consumers will be the big losers.

Costing Consumers: The proposed regulations would cost consumers more than $91 billion over the next ten years. There are much cheaper ways to go digital.

Undermining U.S. Industry: TV set manufacturing is dominated by foreign-owned firms. America leads the world in other kinds of technology, like film and television programming, computers and software – industries that employ over three million workers. Why not help the hometown team, for a change?

Freezing Technology: The proposed regulations are too rigid, limit consumer choice, bring us TV sets that are too expensive, and lock in obsolete technology.

The proposed regulations would stifle innovation and competition, and jeopardize the possibility that the highest quality entertainment and computer technology can be wrapped into a single system affordable to all.

Better, lower cost technology already exists.

The last time the federal government made a decision about television this important was a half-century ago. The decision the FCC is about to make will chart the course for television for the next 50 years. Let's make sure we do it right.

American Society of Cinematographers • Apple Computer, Inc. Business Software Alliance • Compaq Computer Corporation Digital Theater Systems, LP • Directors Guild of America • Intel Corporation • International Photographers Guild, Local 600, IATSE, AFL-CIO • Media Access Project (endorsement only) • Microsoft Corporation • Panavision International LP • Todd-AO Corporation

Americans for Better Digital TV • 703-715-6045 • http://www.dga.org/dga